（＜特集＞大学の語学教育を考える）

Functional English for scientific literacy

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Three and a half years ago I joined the University of Tsukuba as a Foreign Professor in the College of Biological Sciences. My primary responsibility is teaching biology in English. Although this was never explicitly explained to me, I have presumed that the biology faculty regard functional biological English as an essential skill for our students.

Like many other fields, science requires global communication of new results and ideas. A researcher might create the most innovative theories and test them conclusively in elegant experiments. However, if this researcher fails to communicate these results and ideas effectively, his or her achievements will have been wasted and can be regarded as failures. Only in the context of the international forum of science, do results and theories take on meaning and contribute to the advancement of human knowledge of nature.

Publication in professional peer-reviewed journals is the primary means of sharing scientific results and ideas. Thus, many regard the quality and quantity of publications by a researcher to be the best and most objective measure of scientific accomplishment. In fact, the impact of publications is commonly used in evaluating the performance of researchers for hiring and promotion decisions. Sometimes even university programs are rated based on the impact of the publications of their members.

For better or worse, English has become the lingua franca for science. Most of the most influential journals are published in English and most of the most

important scientific meetings are conducted in English. Certainly this situation gives an advantage to native English-speaking scientists. A case can be made that it is unfair for one language to dominate so thoroughly a global field like science. While this may be true, the dominance of English in science today is a fact. Those scientists who cannot achieve effective English language communication skills will be handicapped in their careers.

Why, despite at least 6 years of junior and senior high school instruction in English, do most Japanese graduate from high school terribly uncomfortable with English communication? Since the human brain has evolved the ability to acquire complex language skills, I surmise that there must be something inadequate about the English curriculum in the Japanese secondary schools. In the long term, the solution to this problem of inadequate scientific English fluency and literacy must be solved by improving the secondary school English curriculum. However, I can't wait; I must facilitate major improvements in functional English language skills in the students I teach today.

Though not a linguist, I have thought hard about why it seems so difficult for many Japanese students to become comfortable using English. As infants, almost all children learn to understand and speak the language of their parents comfortably and effectively with no classroom instruction whatsoever. Although not particlarly gifted in mastering foreign languages, I myself can speak 2 beyond my native tongue with some degree of fluency; I learned to use those 2 languages living in the countries where they are spoken. The fluency achieved in these 2 languages contrasts with almost complete failure to learn 3 languages in the classroom during my secondary school days and into university. The implication for me is that classroom instruction is at best an inadequate means of foreign language instruction; success requires the opportunity to use what one is learning. Even in my native language, mastery of advanced skills came only through extensive practical use. Only through practical use have I myself been able to achieve any functional language skills. Thus, for the Japanese students I teach, I have concluded that while classroom instruction has been

more than adequate in quantity if not quality, generally, opportunities for practical use of English in communication have been insufficient.

In all of my undergraduate biology in English classes, I try to convince my students of the necessity of functional English in any science career. Then I explain why I feel that after 6 or more years of classroom English instruction, more English classes will not help them to achieve proficiency; daily practice, even for only a short time each day, is needed. There are many opportunities to use English regularly around the University of Tsukuba; for those students who accept that effective English skills are necessary for their futures, it is not hard to find and take advantage of such opportunities.

Not all students take up the challenge of using English every day. Communicating in imperfect English risks misunderstanding; misunderstandings can result in loss of face, something to be avoided, especially in Japanese society. However, making mistakes and learning from them is the best way to improve skills. Those students able to overcome their 'hazukashi' feelings and use English daily steadily improve.

The courage to make mistakes is essential not only in foreign language learning, but also in science. The scientific method can prove nothing; it is based on falsification of existing ideas, which results in new hypotheses that better describe nature. A student who is unwilling to question existing 'facts' is unable to do research with the scientific method. Students who increase their willingness to make mistakes in their imperfect English are improving not only their English, but also their capacity to think creatively and scientifically.

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